A Demonstration of
Submerged Aquatic Vegetation/Limerock Treatment System Technology for Removing Phosphorus From Everglades Agricultural Area Waters
Second Monthly Report

Introduction

On February 12, 1998, the District contracted with DB Environmental Laboratories, Inc. (DBEL) to design, construct, operate, and evaluate a 13-month, tank-scale (i.e., "mesocosm") demonstration of SAV/ Limerock Treatment System technology for reducing P discharge from EAA waters. The objectives of this project are twofold. First, obtain the performance data and operational experience necessary to evaluate the technical, economic, and environmental feasibility of using SAV/Limerock technology for P removal at either the watershed basin- or farm-scale. Second, guide the design and operation of a larger, field-scale SAV/Limerock demonstration project should the District choose to investigate this technology further. This report summarizes progress during the fifth month (project weeks 17 - 20) by DB Environmental Laboratories, Inc. (DBEL) on the Submerged Aquatic Vegetation/Limerock (SAV/LR) demonstration project.

Synopsis of Progress to Date

North Project Site
We began collecting water quality samples from the hydraulic retention time (HRT) study during June 1998. For this study, we are operating triplicate SAV mesocosms at HRTs of 1.5 days, 3.5 days and 7 days. Each of these mesocosms is followed by a LR bed from which samples are collected after residence times of 1 hour and 5 hours. The first submerged aquatic vegetation (SAV) mesocosm samples were collected on June 1, and the first limerock (LR) bed samples were collected on June 27.

Relative P removal performance of the SAV units operated at different HRTs is depicted in Figures 1 and 2. Following a two week acclimation period, SRP levels dropped below 10 ppb in all treatments (Fig. 1). To date, effluent total P levels are in the range of 18 - 25 ppb, with the longest HRT treatment (7 days) providing the lowest effluent TP concentrations (Fig. 2). The limerock beds situated at the end of the SAV tanks are removing additional P, both at the 1 hr and 5 hr HRTs (Figs. 3 - 5). Note that the LR-Mid designation on the graphs represents the 1 hr HRT sampling location and the LR-Eff represents the 5 hr HRT sampling location. Each data point on the graphs represents the mean of triplicate measurements. To date, the precision of the field and laboratory data in this experiment has been excellent.

We completed macrophyte stocking in the harvest and depth mesocosms during June, and initiated water sampling during July. During this month we also completed fabrication of the 15 three-meter long, vertical columns for the limerock quality and size fraction experiment.

South Project Site
During May 1998 we stocked plants into the 0.5 m deep mesocosms and 0.1 m deep raceways at this location. All units received a mixture of *Ceratophyllum, Najas, Chara* and associated periphyton. During June and July, the macrophyte biomass in the 0.1m deep raceways steadily declined, while the biomass of benthic and floating periphyton has increased. *Ceratophyllum* is the only macrophyte that has continued to persist in these shallow systems. By contrast, the macrophytes, in particular *Chara* and *Najas*, are thriving in the 0.5 m deep systems. We initiated water sampling during mid-July in these systems. In general, effluent P levels have been similar to influent TP concentrations (about 16 - 18 ppb), probably due to the senescence of the macrophytes after stocking.

The 1 cm deep, high-flow raceways have developed a dense growth of periphyton in the influent region of the systems. These raceways are designed for routine biomass harvest and we currently are evaluating several different approaches for harvesting and quantifying biomass production. Initial water quality samples in these systems were collected during the last week of July.

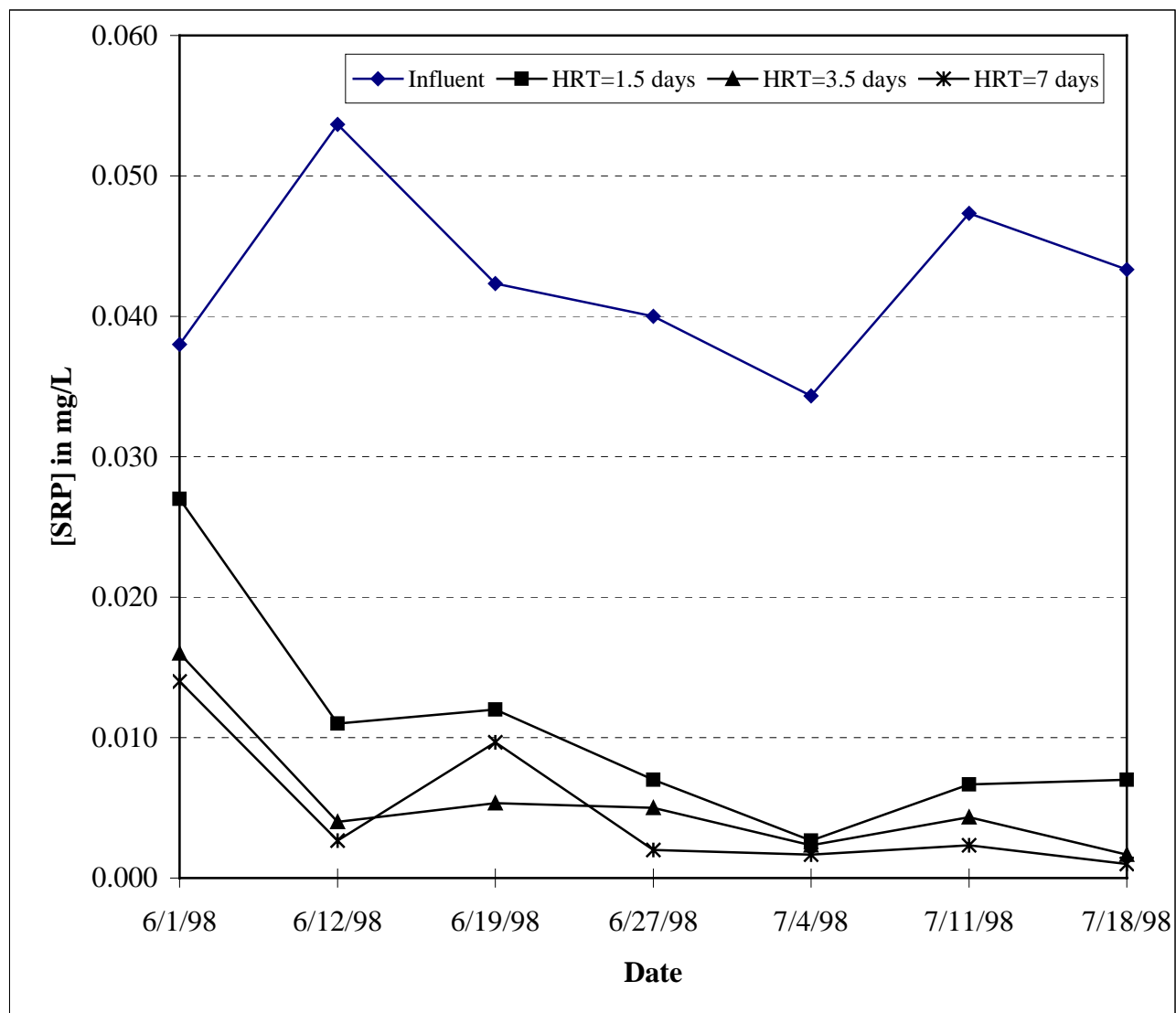**Figure 1. Influent and effluent [SRP] for the SAV mesocosms in the HRT study.**

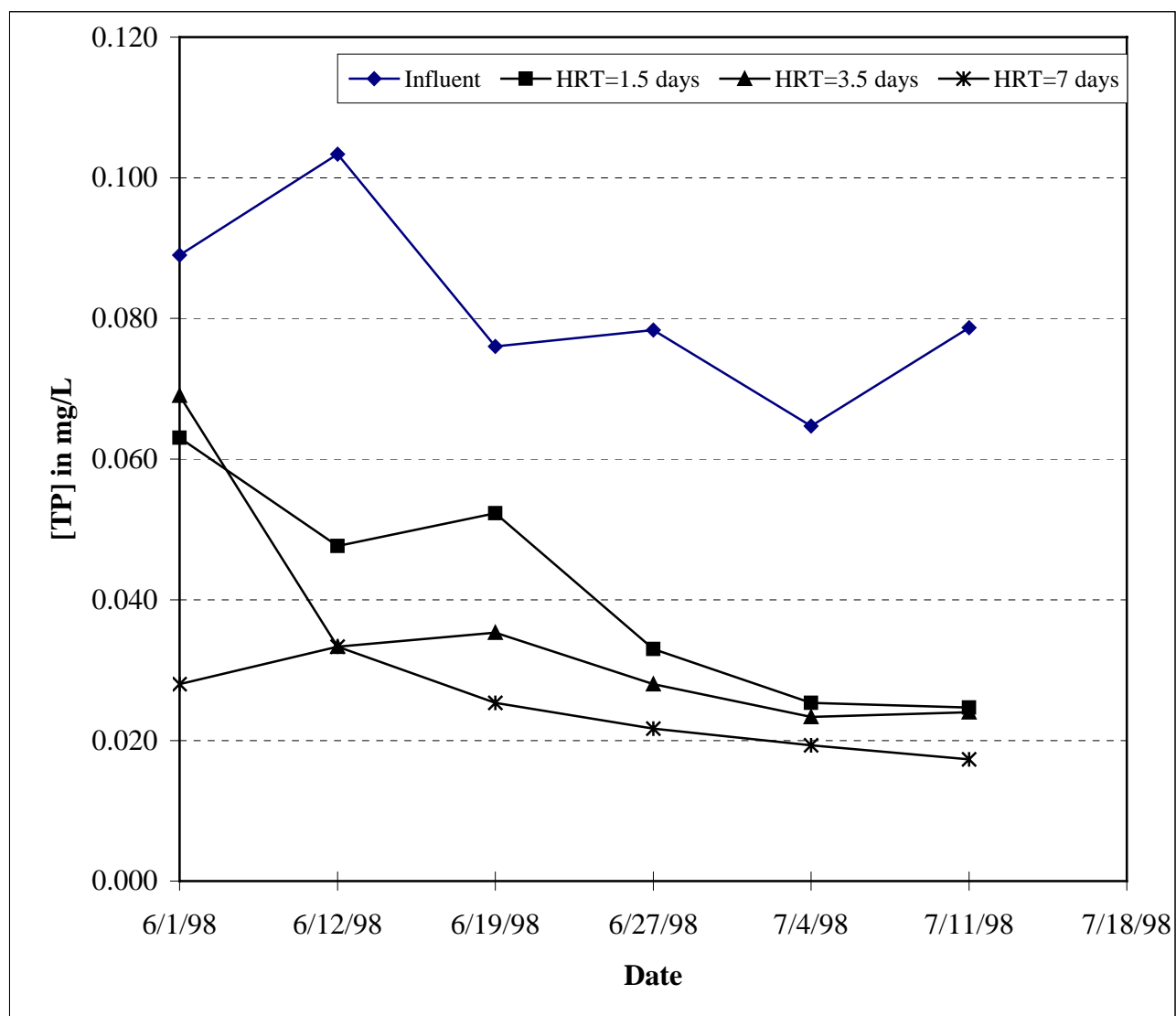**Figure 2. Influent and effluent [TP] for the SAV mesocosms in the HRT study.**

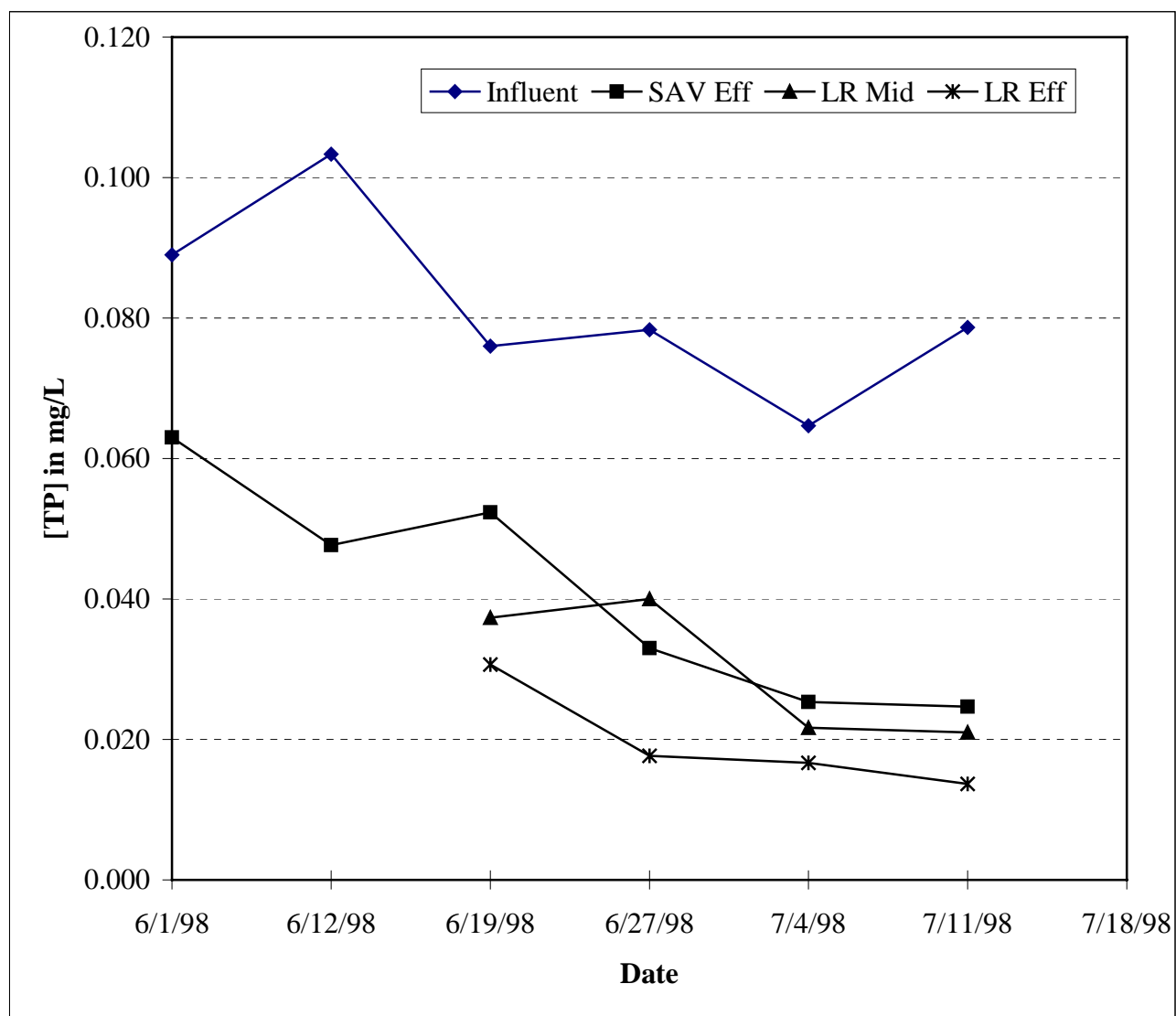**Figure 3. Total [P] through the 1.5 day HRT SAV-LR sequential treatment system.**

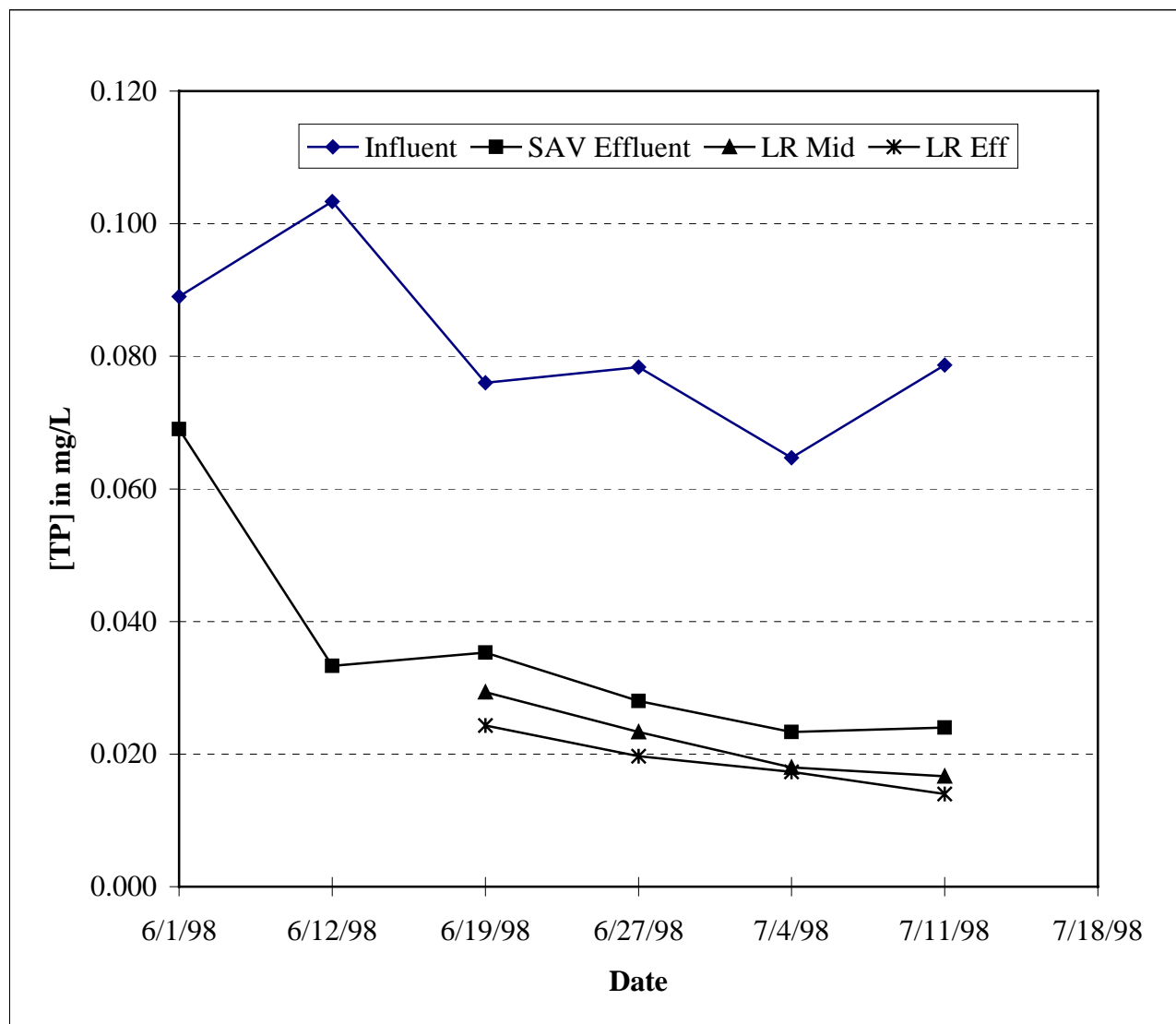**Figure 4. Total [P] through the 3.5 day HRT SAV-LR sequential treatment system.**

Figure 5. Total [P] through the 7 day HRT SAV-LR sequential treatment system.